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METHOD FOR SYNCHRONIZING CIRCUIT RELATED OBJECTS BETWEEN NETWORK MANAGEMENT SYSTEMS AND NETWORK CONTROL PROCESSORS

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BACKGROUND OF THE INVENTION

The present application is related to U.S. Patent Application Serial No. _____, entitled "SYSTEM AND METHOD TO MANAGE INCONSISTENCY PROBLEMS BETWEEN NETWORK MANAGEMENT SYSTEMS AND NETWORK ELEMENTS", attorney docket number 23397.02100, filed October 18, 2001, the disclosure of which are herein incorporated by reference.

Field of the Invention

The present invention generally relates to network management systems, more particular, to uploading circuit related objects to network management system servers.

Discussion of Background

FIG. 1 is a diagram of a maximum number of network control processors (NCPs) that a Network Management System (NMS) can manage. An example of an NCP is a network switch. The NMS allows synchronization of one NCP at a time, for performance purposes. An NMS is required to manage a maximum network size of 10 switches. Each switch may have up to 16k Circuits, a 12k virtual channel connection (VCC) and a 4k virtual path connection (VPC). These circuits may be part of Permanent Virtual Circuits (PVCs), Soft PVCs or Switched Virtual Circuits (SVCs). Each circuit is represented by multiple records (rows in an Simple Network Management Protocol (SNMP) table), which include one cross-connect record, two virtual link records (virtual channel link or virtual path link), and between one and four traffic descriptor records.

Assuming a typical average usage of two traffic descriptors for each circuit (e.g., transmit and receive),and assuming the bulk of the circuits are PVCs, the number of circuit records on an asynchronous transfer mode (ATM) switch can be 80k. That's 16k cross-connects plus 32k virtual links (VLs) plus 32k traffic descriptors. Thus, an almost worst case 10 switch network has approximately 800k circuit records.

Typically, NMS uploads or synchronizes data by making a get request to SNMP. Once SNMP receives the request from NMS, SNMP fetches data from switch, and passes the data over to NMS.

Unfortunately, this approach does not satisfy uploading a massive number of circuits because of performance issues. Based on sample data, uploading 32k circuits would take about 4 hours.

SUMMARY OF THE INVENTION

It has been recognized that what is needed is a way to improve performance for uploading circuit objects to an NMS server.

In one embodiment, a method is provided for synchronizing circuit related objects between a network management system (NMS) and a network control processor (NCP). The method comprises translating data for the circuit related objects from binary data to ASCII data in the network control processor; receiving into the network management system server the ASCII data from the network control processor; parsing the ASCII data; and storing the ASCII data in a network management system database.

Advantageously, performance is improved for uploading or synchronizing circuit objects between an NMS and an NCP.

The invention encompasses other embodiments of a method, an apparatus, and a computer-readable medium, which are configured as set forth above and with other features and alternatives.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will be readily understood by the following detailed description in conjunction with the accompanying drawings. To facilitate this description, like reference numerals designate like structural elements.

FIG. 1 is a diagram of a maximum number of switches (NCPs) that a Network Management System (NMS) can manage.

FIG. 2 is a diagram of the design for synchronizing circuit related objects between a Network Management System (NMS) and an NCP, in accordance with one embodiment of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

An invention is disclosed for a method for synchronizing circuit related objects between a network management system (NMS) and a network control processor (NCP). Numerous specific details are set forth in order to provide a thorough understanding of the present invention. It will be understood, however, to one skilled in the art, that the present invention may be practiced without some or all of these specific details.

Data is retrieved via network control processor (NCP) persistence tables directly instead of using simple network management protocol (SNMP).

FIG. 2 is a diagram of the design for synchronizing circuit related objects between an Network Management System (NMS) and an NCP, in accordance with one embodiment of the present invention. Three general steps are shown for this design. However, the present invention is not limited to these specific steps nor this particular number of steps.

Step 1: Data Translation In NCP

In one embodiment, the NMS server 102 initiates a translation script in NCP using "rsh" UNIX command, which will translate a circuit related persistence table from binary to ASCII format. Persistence tables basically are binary files where data for all different types of objects get store in the NCP 104. When users make any changes through a line operator interface (LOI) or NMS for a certain type of object, its persistence table will get updated as well. Thus, the

persistence table is the place that the NMS server 102 is interested for object synchronization. Moreover, this step cannot be done in the NMS server 102 because it requires some support from NCP utilities.

Step 2: Copy Data Remotely To The NMS

Once the translation is done, the NMS server 102 will start copying the ASCII table back to the NMS server 102 via "rcp" command. The UNIX command "rcp" performs a remote copy that allows user to copy files from a remote workstation. The accessible directory in the host machine has to have the remote machine's host name and user name in order to copy files successfully. Host machine at this point is the NCP. The remote machine is the NMS workstation.

Step 3: Parse And Store Data Into NMS Database

After the remote copy operation has succeeded, the data is parsed and stored into the NMS database 106. The format of ASCII persistence table is a plain text file which maintains all available records for one type of object in NCP. At this point, what NMS needs are the circuit objects. Each record consists of a unique key, and a group of attribute names and corresponding values. The key is used to identified an individual circuit, and can be a combination of more than one attribute.

However, this format is not compatible with the one from the NMS database 106. Consequently, the parsing module of the NMS server 102 reads all records from a persistence table,

parses the records to NMS desired format, and stores the records into memory. Once these steps are done, if the NMS database 106 is empty of an earlier version of the desired persistence table, the parsed records in memory are written into a formatted text file offline. A program would then issue an execution to insert data from the offline text file into the NMS database 106 directly.

On the other hand, is the NMS database 106 is not empty of an earlier version of the desired persistence table, the parsed records in memory would be compared with data from the same object table in the NMS database 106. If a mismatch occurred between two tables, the NMS database 106 would be updated accordingly.

System And Method Implementation

Portions of the present invention may be conveniently implemented using a conventional general purpose or a specialized digital computer or microprocessor programmed according to the teachings of the present disclosure, as will be apparent to those skilled in the computer art.

Appropriate software coding can readily be prepared by skilled programmers based on the teachings of the present disclosure, as will be apparent to those skilled in the software art. The invention may also be implemented by the preparation of application specific integrated circuits or by interconnecting an appropriate network of conventional component circuits, as will be readily apparent to those skilled in the art.

The present invention includes a computer program product which is a storage medium (media) having instructions stored thereon/in which can be used to control, or cause, a computer to perform any of the processes of the present invention. The storage medium can include, but is not limited to, any type of disk including floppy disks, mini disks (MD's), optical discs, DVD, CD-ROMS, micro-drive, and magneto-optical disks, ROMs, RAMs, EPROMs, EEPROMs, DRAMS, VRAMs, flash memory devices (including flash cards), magnetic or optical cards, nanosystems (including molecular memory ICs), RAID devices, remote data storage/archive/warehousing, or any type of media or device suitable for storing instructions and/or data.

Stored on any one of the computer readable medium (media), the present invention includes software for controlling both the hardware of the general purpose/specialized computer or microprocessor, and for enabling the computer or microprocessor to interact with a human user or other mechanism utilizing the results of the present invention. Such software may include, but is not limited to, device drivers, operating systems, and user applications. Ultimately, such computer readable media further includes software for performing the present invention, as described above.

Included in the programming (software) of the general/specialized computer or microprocessor are software modules for implementing the teachings of the present invention, including, but not limited to, translating data for the circuit related objects from binary data to ASCII data in

the network control processor, receiving the ASCII data from the network control processor, parsing the ASCII data, and storing the ASCII data in a network management system database, according to processes of the present invention.

In the foregoing specification, the invention has been described with reference to specific embodiments thereof. It will, however, be evident that various modifications and changes may be made thereto without departing from the broader spirit and scope of the invention. The specification and drawings are, accordingly, to be regarded in an illustrative rather than a restrictive sense.